Appendix F

Project Proposal

This appendix contains the project proposal that was submitted by the consultant team in response to the RFP by King County DNRP.

Proposal

For

Feasibility Study

Anaerobic Digesters for King County Dairies

To

King County Department of Natural Resources and Parks

Seattle, Washington

Environmental Resource Recovery Group, LLC

October 10, 2002

Proposal for Feasibility Study

Submitted to: King County Department of Natural Resources and Parks

October 10, 2002

Background

Anaerobic digestion is a well-documented method for treatment of livestock wastes. It is an effective means for reducing odors, reducing manure solids and converting animal wastes into renewable energy. But the adoption of anaerobic digestion by livestock producers in the United States has been rather slow, for a number of reasons – both economic and non-economic. The perceived benefits to be derived from the substantial investment in a digester by livestock producers just have not been great enough to stimulate (or force) investment of money, which they usually do not have, into such a facility.

Attitudes are changing in regard to the incentives for using anaerobic digestion. The public is now expressing a strong positive attitude toward renewable energy and toward environmental stewardship. Most importantly, they are willing to contribute toward those ends. By doing so, the advantages of anaerobic digestion to the general public can be monetized in such a way that the burden of owning and operating digesters can be spread over all of those who benefit from them, not just the livestock producers.

Environmental Resource Recovery Group, LLC is composed of individuals who have been involved with anaerobic digestion for many years and have been pioneers in the field. We are a group with diverse backgrounds but with the common interest of bringing solutions for problems facing agricultural producers that are workable, beneficial and economically viable. Our business plan is to partner with other interested parties (engineering/constructors, financial interests) to develop waste-to-energy projects in agriculture. We have developed a series of analytical tools that we use routinely for waste-to-energy project evaluation.

Two computer copyrighted software products:

- "Economic Feasibility of Biogas Recovery and Utilization", and
- " A Computer Model for Livestock Waste Nutrient Management"

are used to evaluate the economic feasibility of waste management and biogas projects in agriculture and agribusiness. Both are very producer-oriented, pragmatic and effective in providing consistent analytical feedback as projects are explored and assessed. The first is used to evaluate the economic alternatives in biogas (anaerobic digestion) projects and the second is used in the preparation of Comprehensive Nutrient Management Plans.

The background and experience of our group and the availability of these computer models assures us that we can perform this feasibility study in a timely and proficient manner. We will be creative, business-based, pragmatic and sound, both technically and analytically, as we strive to assemble a workable and highly desirable anaerobic digestion project for the dairymen and citizens of King County.

Approach to the Study

This study will be conducted in the same manner as if we were going to build, own and operate the project ourselves. We use return on investment analysis, return on equity analysis and critical factor sensitivity analysis as project evaluation benchmarks. The computer models are already available for systematically evaluating data and reporting results. We will place our emphasis on collecting relevant information concerning this project and translating that it into terms for evaluation by the computer software. The computer does not make decisions, but allows the researcher to quickly evaluate possibilities – some of which might never be considered without the computerized tool.

Information necessary for completion of this study falls into four categories: technical, economic, financial and operational.

1. Technical – This includes information related to the characteristics of the waste stream, the technical aspects of digester design, weather factors and other design criteria. Mostly, this information will not be unique to King County dairies. But this is the information necessary to complete Item 1 of the Feasibility Study – evaluating alternate

technology and discussing the applicability of various technologies to the potential project in the county and is necessary for completion of the study.

2. Economic – Economic information includes all prices, costs and values assigned to components of the project. It includes the costing of the capital items for constructing the project, costing the operating components on the ongoing project over its useful life and valuing the income and project revenue items. There are two phases – each equally important. 1) Identifying all of the potential cost and income items (including public and private incentives), and 2) Placing a value on each item that is provable, justifiable or assured.

3. Financial – Financial information includes such items as debt/equity balances, depreciation and tax alternatives, interest rates on debt, grants and credits available, financial organization of the project, ownership structure and other factors which affect ROE (Return on Equity) and returns to the stakeholders (stockholders). A project with strong economic feasibility can be improved by properly including debt in the capital structure. A project with unacceptable economic prospects might be improved using financing programs, but doing so may be inherently risky. In such a case it is the decision of the stakeholders whether the potential benefits justify the risk.

4. Operational – It seems an over-simplification to say that before a problem can be solved, one must know what the problem really is. But that fact is too often overlooked or lost in the enthusiasm to apply a "preconceived" solution. The practical aspects of the project include delineating the boundaries -- what is possible (legal, logistics, perceptions), and what is not possible, as well as assessing how well (benefit vs. cost) a possible solution works to meet the needs of the stakeholders. Most of the operational information that is collected will be used to determine what alternatives to evaluate with the computer model, rather than as direct input into that model.

1. Survey the Participants

The first activity of the study will be to individually interview each of the stakeholders in this prospective project. This will be done individually rather than in a group in order to truly gather the ideas and feelings of each party without pressure from other members.

A. For entities other than the dairies, we want to find what each of the parties:

- Expects to receive/gain from participation in the project
- Is willing/able to contribute to the success of the project
    - Capital support
    - Operating support
    - Non-financial support
- Feels that the project must/must not do (or be) in order to be successful
- Other perceived attributes for the project

B. For the dairies the following information (and more) will be explored:

- Waste management practices on each farm
    - Collection, handling, storage, disposition
    - Equipment used and cost
    - Time and costs involved
- Impact of manure nutrients on the operation
    - Nutrient management plan
    - Nutrient excess or deficit – asset or liability
    - Current and potential acreages and crops for nutrient utilization
- Future plans for the business
    - Expansion
    - Contraction
    - Out of business
    - Next generation
- How would future plans for the business be affected if manures were dissociated from the land
    - Expand herd
    - No effect
    - Negative effect

- Operational impact from a centralized digester
    - Avoided operating costs
    - Operator time
    - Avoided capital costs
        - Normal operations
        - Meeting new environmental regulations

From the interviews, we will be able to quantify certain aspects necessary to assess the feasibility of a digester project – such things as the solids content of manure which must be transported, prospective cost savings (operating and capital) which might accrue to the project and the importance of being able to export nutrients from the farm. Attitudes about the future (with and without a digester project) will be subjective, but a valuable result from the interviews.

2. Other Data Collection

Concurrent with the interviews other necessary data will be collected, such as power rate structures, prospective locations for a collective digester, road mileages from each farm to those sites, certain capital items such as trucks and specialized trailers for hauling manure. We will look for potential nutrient sinks – places where nutrients can be utilized in an agronomic manner without going back to the farm from which they came. We will assess the local market potential for organic solids separated from the digester effluent. The solids from a thermophilic digester are usable in certified organic food production and have been shown to have a premium market value at other locations. The prospect of bringing other, non-dairy manure wastes to the digester site will be investigated.

3. Alternate Technology Assessment

Reports will be prepared for fulfillment of Item 1 of the RFP – Evaluation of Alternate Technologies. At least three technologies will be selected, and they will include:

- Plug Flow Digester
- Mesophilic Mixed Digester
- Thermophilic Mixed Digester

The computer model will be used for this analysis. It is specifically designed to calculate estimated capital costs, revenues, operating costs and ROI (Return on Investment) with varying technologies (identified by design parameters) and varying size (specified by animal type and numbers), as well as energy and material balances.

The model also has the unique ability to operate in “collective mode”, by incrementally evaluating digester economics while adding additional waste sources. In terms of this project, the model can start with one farm and add additional farms one at a time. At each step, both the waste stream and the transport cost of bringing the wastes to the digester site are added to project and a new project analysis is performed. Typically, a project will show improving economies of scale until the costs of transporting the waste from farther and farther offset those economies. Then the project economics deteriorate. A sample of such an analysis is presented in the Appendix. Experience has shown that waste, if of sufficiently high solids content, can be transported farther than might be otherwise thought.

4. Project Economic Feasibility Assessment

Based upon data collected from the project participants, the dairies and other sources, as well as upon the combined experience of our group, we will perform economic and financial analysis on the collective digester project. This is an iterative process. Numerous possibilities will be evaluated. The computer model does not make any decisions, but rather acts only as a high-speed and consistent calculator. Each case to be considered is evaluated for ROI, ROE, Income Statement, Balance Sheet, material balances, energy balances, etc. Most importantly, sensitivity analysis shows the economic effect of variance from plan of the key economic and technical factors. Sample reports for the Economic Feasibility of Biogas Capture and Utilization are presented in the Appendix.

There is no <u>one</u> perfect project. But the final report for this study will evaluate one particular case, the one which we have judged to best meet the needs of the project participants, and totally assess the feasibility of that case. Of greater value for the next phase of this project will be the analysis of the “bounds of feasibility”. The most significant variable factors for the analysis, the ones that have the most likelihood for variance and the most impact on the final feasibility of the project, will have been identified and quantified. Sensitivity analysis is an integral component of the economic feasibility model. A project that relies too heavily upon one factor, especially if that factor is considered to be uncertain or variable, is less viable than one that maintains feasibility over a wide range of economic and technical realities.

5. Ownership Options and Financing Mechanisms

These two elements of the RFP are integrally related and will be considered together. At least two (and perhaps more) prospective ownership structures will be identified and evaluated, along with the potential financing mechanisms that go with them. Ownership structures that will be evaluated include:

- Complete third-party ownership, and
- Joint ownership by the dairy farmers and some of the other interested parties, and perhaps
- Total ownership by the dairy farmers, and perhaps
- Total ownership by a utility

The ability to use EQIP funds from the U.S. Farm Program will play a major role in determining the ideal ownership structure and financing alternatives. Theoretically, EQIP grants could fund up to 50% of the project, if the necessary conditions are met and the funds are available. The Farm Bill designates that 60% of the total EQIP monies be used for livestock waste projects, but, even so, demand for the funds will likely outstrip the supply. Active intervention by the state NRCS office could be decisive in determining the availability of such funding for this project. That fact illustrates the importance of having the non-dairy participants actively involved in the project. Potential EQIP funding is so important that its availability alone might dictate the recommended ownership structure.

The availability of Industrial Development Bonds (or similar bonds) for use in this project would favor a different ownership structure, one in which at least one (and perhaps more) public or private non-dairy entities would be required to “support” the bonds. Such bonds would carry a very low interest rate but could put a burden upon the agency supporting them. Such an agency must justify such support by an offsetting benefit derived from the project. During the survey of the participants, this topic will by investigated.

6. Digester Site Characteristics

For the evaluated project, required and recommended site characteristics will be delineated. Required characteristics include minimum acreage and infrastructure (roads, gas, water, power lines). Certain other minimum requirements will be dictated by characteristics of the selected digester plant. For example, it seems likely that the export of nutrients from the dairy farms to other uses may be a critical component of this project. That topic will be assessed during the interviews with the dairymen. If that were the case, it would be beneficial that the plant be located near a large user of water-borne nutrients.

Zoning, proximity to neighbors, waste-hauling miles, and suitability for expansion are other considerations that are important. As always, there will be trade-offs that must be considered. Such trade-offs can be assessed with the aid of the computer model. For example, if the only suitable site available was located far from the center of gravity of the affected dairies, the computer model would tell, all other factors being equal, how many miles the material could be hauled (the cost of transport) while maintaining a specified minimum ROI.

Deliverables and Timeline

In fulfillment of this contract, the following items will be delivered:

1. A preliminary oral report with slide show, for your selected participants, with the purpose of presenting preliminary findings taking input for refining those findings for presentation in the final report.

   Timeline: Within 6 weeks of the project award. If award is made on November 1, the preliminary report could be made before Christmas.

2. A final written report, with oral and slide show and live computer model, detailing all of the study findings and including comprehensive coverage of the five major points identified in the RFP.

   Timeline: Within 4 weeks of the preliminary report.

3. The computer models on which the final report is based will be maintained so that they can be called upon when the project goes forward toward development. The models can be used to track detailed project planning and design against conditions identified in the feasibility study -- to prevent "backsliding" of the actual project from its initial plan. The model can also be used after the project is in operation to track actual-versus-expected project performance.